How does temperature affect the surface tension of water?

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ABSTRACT

Surface tension is a property of liquids that reduces the amount of energy in the liquid because the bonds between the surface molecules of the liquid are harder to stretch. One way to affect the surface tension of water is to change the temperature of the water. It was observed that as the temperature of the water increased, the surface tension of the water decreased.

BACKGROUND

Surface tension is caused by various intermolecular forces that attract molecules of the liquid toward one another. In the bulk of the liquid, each molecule is pulled equally in all directions by the neighboring liquid molecules. This results in a net force of zero. At the surface of the liquid, the molecules are pulled inwards by other liquid molecules deep inside the liquid, but they are not attracted as strongly by the molecules in the neighboring air. Water molecules are more attracted to like water molecules than to the different air molecules present at the liquid's surface. Therefore, all of the liquid molecules at the surface are subject to an inward force of molecular attraction, which causes the liquid to squeeze itself together until it has the locally lowest surface area possible.[1]

HYPOTHESIS

If the temperature of water increases over time, then the surface tension of water will decrease, because molecules spread farther apart as temperature rises.

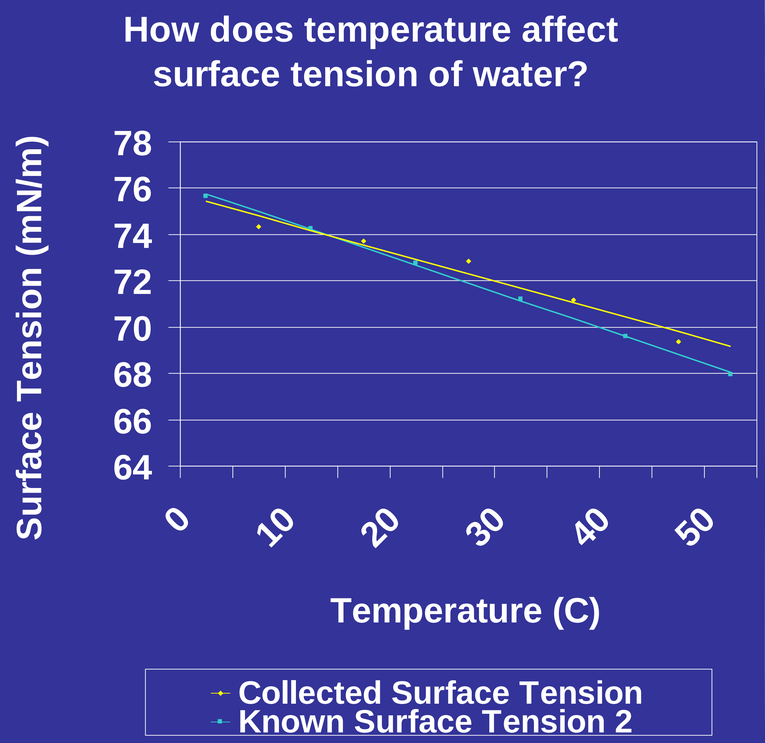
METHODS

1. Calibrate the tensiometer
2. Put deionized water in container in tensiometer
3. Put plate on hooks of tensiometer and saturate in water
4. Determine surface height of water
5. Set speed to 10 mm/min and immersion depth to 3.0 mm
6. "Tare" and "Play"
7. Collect data for different temperatures
8. Analyze data
9. Write Conclusions

RESULTS

As the temperature of the water increased, the surface tension of water decreased.

Surface Tension = -0.6245 (Temp) + 76.037



DISCUSSION

Surface tension is a property present in water that reduces the amount of energy that exists between water molecules at the surface. Water at low temperatures has a higher surface tension because the bonds between the water molecules are harder to stretch. The close contact between the molecules reduces the amount of energy present between the molecules. As the temperature increases, more energy is present, causing the molecules to stretch more, which reduces the surface tension.

REFERENCES

[1] Wikipedia, the free encyclopedia http://en.wikipedia.org/wiki/Surface_tension

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